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Description

The invention relates to a suction nozzle assembly for a vacuum cleaner, particularly a household vacuum cleaner, which comprises a suction spout having a coupling stem for fluid-connection with the vacuum cleaner, a generally rectangular nozzle housing tiltably connected with the suction spout and having a sweeping surface defined at the bottom thereof, said sweeping surface being adapted to confront a surface to be cleaned, an elongated brush assembly carried by the nozzle housing for movement between projected and retracted positions in a direction perpendicular to the longitudinal sense of the housing through the sweeping surface, a brush height adjustment for adjustably moving the brush assembly to either of the projected or retracted positions.

Examples for such suction nozzle assemblies for vacuum cleaners are disclosed in US-A-2,034,196 and DE-A-23 30 867. The height of the brush assembly can be varied in relation to the housing in order to adapt it to the kind of floor to be cleaned, and the construction is convenient in that, since the housing and the spout are relatively tiltably connected together, the plane of opening of the suction channel can be kept substantially parallel to the surface to be cleaned even though the angle of inclination of the tubular handle changes relative to such surface during repeated forward and backward movement of the nozzle assembly and/or as a result of changes in posture of the operator running the vacuum cleaner. However, when in the course of cleaning relatively large dirt, such as debris or like solids, is to be removed from the surface to be cleaned, it is desirable to lift the nozzle assembly to hang over the debris or like solids to suck them effectively through the suction channel. The nozzle assembly is, however, apt to unnecessarily tilt downwards with the suction channel consequently turning aside from above the debris or like solids, making it difficult for the operator to place the nozzle assembly so as to hang over them.

In addition, although there will be no problem when and so long as the paired brushes are adjusted to a small height position at which the brushes protrude a small distance outwardly from the bottom of the housing, the adjustment of the brushes to a great height position at which they protrude a great distance outwardly from the bottom of the housing poses a problem in that, since the nozzle assembly itself is supported by the brushes above the surface to be cleaned, the nozzle assembly during its movement along the surface to be cleaned tends to lack stability and often undergoes a jolting motion with the brushes buckling back and forth.

It is an object of the present invention to eliminate the above discussed disadvantages and inconveniences inherent in the prior art nozzle assemblies. A particular object is to avoid an arbitrary tilting motion of the nozzle assembly relative to the tubular handle under certain conditions, but permit free tilting relative thereto during normal cleaning conditions.

A further particular object of the present invention is, in case a brush height adjustment for adjusting the position of the brushes is provided, to lock the nozzle assembly relative to the tubular handle in certain adjustment positions.

This object is being solved by a suction nozzle assembly as defined above, which is characterized by restraining means for restraining the housing from undergoing an arbitrary tilting motion relative to the suction spout.

Preferable embodiments of the invention are defined in the dependent claims.

The features of the present invention will become clear from the following description taken in conjunction with preferred embodiments thereof with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a suction nozzle assembly for a household vacuum cleaner embodying the present invention;

Fig. 2 is a perspective view of the suction nozzle assembly as viewed from below;

Fig. 3 is a top plan view of the suction nozzle assembly with a top housing component removed;

Fig. 4 is a longitudinal sectional view of the suction nozzle assembly;

Fig. 5 is an exploded view of an essential portion of the suction nozzle assembly according to one embodiment of the present invention;

Figs. 6 to 8 are fragmentary transverse sectional views of the nozzle assembly with brushes shown as adjusted to different heights, respectively;

Figs. 9 to 10 are views similar to Fig. 5, showing second and third embodiments of the present invention, respectively;

Fig. 11 is a view similar to Fig. 5, showing a fourth embodiment of the present invention;

Figs. 12 and 13 are transverse sectional views of a portion of the nozzle assembly, showing the brush height adjustment at different operative positions, respectively; and

Fig. 14 is a view similar to any one of Figs. 12 and 13, showing a modification of the embodiment of Fig. 11.

Before the description of the present invention proceeds, it is to be noted that like parts are designated by like reference numerals throughout the accompanying drawings.

Referring now to Figs. 1 to 8, a generally T-shaped nozzle assembly for a household vacuum cleaner comprises a generally rectangular flattened box-like housing 1 including top and bottom housing components 2 and 3 connected together one above the other by means of a circumferential bumper 4. A suction spout of generally T-shaped configuration including a transverse barrel 6 and a coupling stem 5 protruding perpendicularly from an intermediate portion of the transverse barrel 6 is connected to the housing 1 with the transverse barrel 6 rotatably received in an intermediate portion of the housing 1 and with the coupling stem 23 protruding

rearwardly of the housing 1 generally at right angles thereto.

The bottom housing component 3 has a pair of spaced casters 7 rotatably carried thereby on respective sides of the transverse barrel 6 and also has a suction channel 10 defined therein so as to open at the bottom of the nozzle assembly. The suction channel 10 is constituted by a suction opening 8 and a pair of elongated suction recesses 9 in line with each other and extending from the suction opening 8 in the opposite directions with respect to each other, respectively, lengthwise of the housing 1. A pair of parallel slots 10' are defined in the bottom housing component 3 on respective sides of the suction channel 10 so as to extend lengthwise of the housing 1. As best shown in Figs. 6 to 8, a lip member 11 made of a strip of flexible material, for example, rubber, is secured to the bottom housing component 3 with one of its opposite sides embedded in a region of the bottom housing component 3 between the suction channel 10 and one of the slots 10' adjacent the transverse barrel 6 and extends lengthwise of the housing 3 generally in parallel to the suction channel 10.

Within the interior of the housing 1, there is disposed a pair of brushes 12 and a brush height adjusting body 13. The brushes 12 are of identical construction with each other each comprising a respective holder bar 14 having a plurality of equally spaced bundles of bristles 15, which bundles 15 are implanted on the respective holder bar 14. The holder bars 14 are formed at their opposite ends with bearing holes 16 and are movably supported by the bottom housing component 3 with the bearing holes 16 receiving respective bosses 17 therethrough, which bosses 17 are integrally formed with the bottom housing component 3 so as to protrude towards the top housing component 2 as best shown in Fig. 4. The brushes 12 so supported in the manner as hereinabove described can project outwards from the respective slots 10' to any one of a plurality of, for example, maximum, intermediate and minimum, height positions as will be described later.

The brush height adjusting body 13 is a generally rectangular framework including a pair of parallel transverse strips 18 and a pair of spaced bridge members bridging between the transverse strips 18. This brush height adjusting body 13 is positioned within the interior of the housing 1 for movement in a direction lengthwise of the housing 1 and is movably supported by and sandwiched between the top and bottom housing components 2 and 3. This adjusting body 13 is operatively associated with the brushes 12 and, for this purpose, each of the transverse strips 18 has its opposite end portions formed with stepped guide grooves 19 each having three steps corresponding respectively to the maximum, intermediate and minimum height positions for the brushes 12. On the other hand, each of the holder bars 14 has a pair of spaced pins 20 protruding laterally from the opposite end portions thereof. The brushes 12 are operatively coupled with the adjusting body 13 with the pins 20 inserted in the respective stepped guide grooves 19, so that as the adjusting body 13 is adjustably moved in a direction lengthwise of the housing 1, the brushes 12 can be moved in a direction perpendicular to the direction of movement of the adjusting body 13. As best shown in Fig. 1 in combination with Fig. 5, the top housing component 2 has formed therein a rectangular slot 22 through which a manipulatable knob member 21 rigidly mounted on, or otherwise integrally formed with, one of the bridge members of the adjusting body 13, protrude loosely for the access to the operator. Thus, it will readily be seen that, by moving the knob member 21 within the slot 22, the adjusting body 13 can be moved in the direction parallel to the direction of movement of the knob 21, i.e., lengthwise of the housing 1 for the adjustment of the height of the brushes 12 that project outwards through the respective slots 10'.

The coupling stem 5 of the suction spout is fluid-connected with a tubular handle 26 through an elbow 23 having one end rotatably coupled with the coupling stem 5 and the other end received in the tubular handle 26. The transverse barrel 6 has its wall portion formed with an opening 24' through which the suction channel 10 is communicated with the tubular handle 26 which is in turn communicated with the vacuum source. One end of the transverse barrel 6 has a flange 6a integral therewith and protruding axially thereof, which flange 6a is formed with a generally V-shaped recess 24 extending axially inwardly of the transverse barrel 6. Operatively associated with the recess 24 is an engagement piece 25 integrally formed with, or otherwise rigidly mounted on, the adjusting body 13. The engagement piece 25 in the adjusting body 13 is so shaped and so positioned that, only when the adjusting body 13 is moved rightwards, as viewed in Fig. 3, to the maximum height position as shown by the double-dotted chain line, the engagement piece 25 can be engaged in the recess 24 to refrain the nozzle assembly as a whole from tilting relative to the tubular handle 26 about the longitudinal axis of the transverse barrel 6.

The other of the bridge members remote from the manipulatable knob member 21 is formed with a resilient tongue 27 protruding therefrom in a direction opposite to the manipulatable knob member 21 and parallel to the longitudinal sense of the adjusting body 13, the free end of which tongue 27 is integrally formed with a detent piece 28 selectively engageable in any one of detent recesses 29a, 29b and 29c formed in the top housing component 2 in alignment with the path of movement of such detent piece 28. The detent recesses 29a, 29b and 29c correspond in position respectively to the maximum, intermediate and minimum height positions of the adjusting body 13.

While the nozzle assembly is constructed as hereinbefore described, it operates in the follow-

ing manner. As is usual with most conventional nozzle assemblies, dirt sucked into the suction channel 10 through the suction opening 8 and the suction recesses 9 on respective sides of the suction opening 8 during the operation of the vacuum cleaner are further sucked into a dust bag (not shown) through the suction spout, the elbow 23 and the tubular handle 26 which may be coupled with the canister either directly or through a flexible hose (not shown).

Depending on the type of the surface to be cleaned, the height of the brushes 12, that is, the distance over which the brushes 15 project outwards through the respective slots 10', has to be adjusted. This will be described with particular reference to Figs. 6 to 8.

In the case where the surface to be cleaned comprises a carpet as shown in Fig. 8, the adjusting body 13 has to be moved to the minimum height position by manipulating the knob member 21. As the adjusting body 13 is moved towards the maximum height position, the pins 20 on the respective brush holder bars 14 are moved within the stepped guide grooves 19 to the highest step at which the brush bristles 15 are retracted inwardly of the housing 1 through the slots 10'. More specifically, upon the arrival of the adjusting body 13 at the minimum height position, the bundled bristles 15 of the front brush 12 with respect to the direction of forward movement of the nozzle assembly during the cleaning are retracted inwardly through the associated slot 10' into the housing 1 whereas the bundled bristles 15 of the rear brush 12 protrude to a height smaller than the height of the lip member 11 as shown in Fig. 8.

In the condition shown in Fig. 8, the lip member 11 slidingly contacts the carpet, providing a curtain that permits dirt, located frontwardly and laterally of the nozzle assembly, to be sucked. At this time, a maximum inlet velocity of air being sucked can be obtained, that is, the drag force is maximized. It is to be noted that the bundled bristles 15 of the rear brush 12 serve to drag dirt, clinging to the carpet, off from the carpet, which dirt is subsequently sucked into the suction channel 10 when the nozzle assembly is drawn backwards.

When the surface to be cleaned comprises a flat floor, for example, a bare floor such as shown in Fig. 7, and where the cleaning is effected without substantially reducing the inlet velocity of air being sucked, the adjusting body 13 has to be moved to the intermediate height position as shown in Fig. 7. At this time, the pins 20 are moved within the guide grooves 19 to an intermediate step between the highest and lowest steps, at which the bundles bristles 15 project outwardly of the housing 1 to an intermediate height generally equal to the height of the lip member 11. Even in this condition, the lip member 11 slidingly contacts the floor surface and, therefore, a relatively high inlet velocity of air being sucked can be obtained.

It is to be noted that, so far as the adjusting body 13 is moved to any one of the maximum height position and the intermediate height position, the engagement piece 25 is disengaged from the recess 24 and, accordingly, the tubular handle 26 connected with the suction spout is freely tiltable relative to the nozzle assembly to accommodate changes in posture of the operator running the vacuum cleaner. Thus, regardless of what posture the operator may take during the cleaning of the surface to be cleaned, the nozzle assembly can be kept substantially parallel to the surface being cleaned to bring an efficient cleaning action on the surface.

When it happens that, during the cleaning of the floor, the force required to push the nozzle assembly forwards, that is, the drag force, is desired to be reduced by reducing the inlet velocity of air being sucked, the adjusting body 13 has to be moved to the maximum height position as shown in Fig. 6. At this time, the pins 20 are guided within the guide grooves 19 to the lowest step at which the bundles bristles 15 project outwards to the maximum height. During the cleaning with the bundled bristles 15 projecting to the maximum height as shown in Fig. 6, the lip member 11 is lifted above the floor and, accordingly, air outside the nozzle assembly is drawn from all directions into the suction channel 10 and the drag force with which the nozzle assembly is drawn close towards the floor is consequently reduced.

At the same time, the engagement piece 25 is engaged in the recess 24 with the adjusting body 13 held at the maximum height position and, accordingly, the nozzle assembly is refrained from undergoing any arbitrary tilting motion relative to the tubular handle 26. As is well understood by those skilled in the art, when and so long as the bundled bristles 15 protrude outwards from the bottom of the nozzle assembly to the maximum height as shown in Fig. 6, the nozzle assembly itself is substantially supported above the floor by the brushes and is, therefore, apt to be jolted as it is moved forwards and backwards with the bristles 15 buckling resiliently. Specifically, as the nozzle assembly is moved forwards by the application of an external pushing force to the tubular handle 26 during the cleaning, the bundled bristles 15 of the rear brush 12 are bent rearwardly with the front of the nozzle assembly consequently pitched upwards. Conversely, when the nozzle assembly is moved backwards by the application of an external pulling force to the tubular handle 26, the bundled bristles 15 of the rear brush 12 return to the original shape to make the nozzle assembly assume a generally parallel relationship to the floor.

In view of the above, the engagement of the engagement piece 25 fast or integral with the adjusting body 13 into the recess 24 to restrain the nozzle assembly from tilting relative to the tubular handle 26 is advantageous in that any arbitrary pitching motion of the nozzle assembly as a result of the buckling of the bundled bristles 15 can be avoided and also in that, where debris

or like solids are desired to be removed, the nozzle assembly can be placed so as to hang over them without changing the angular relationship between the nozzle assembly and the tubular handle 26.

The restraining mechanism for restraining the nozzle assembly from tilting relative to the tubular handle, which has been shown as comprised of the engagement piece 25 in combination with the recess 24 in the foregoing embodiment, may take numerous forms such as shown in Figs. 9 and 10.

Referring to Fig. 9, the restraining mechanism comprises a brake shoe 25a rigidly mounted on the adjusting body 13 for movement together therewith, which shoe 25a is engageable with an arcuate end face 24a of the flange 6a integral with the transverse barrel 6. It will readily be seen that, when the adjusting body 13 is moved to the maximum height position, the brake shoe 25a is relatively brought into engagement with the arcuate end face 24a of the flange 6a.

The restraining mechanism of the construction shown in and described with reference to Fig. 9 is particularly advantageous in that the nozzle assembly can be restrained at any desired angular position relative to the tubular handle 26.

Referring now to Fig. 10, the restraining mechanism shown therein comprises an engagement pin 31 carried by the adjusting body 13 and movable between retracted and projected positions, and a biasing spring 30 urging the engagement pin 31 in one direction to the projected position. When the adjusting body 13 is moved to the maximum height position, the engagement pin 31 normally biased by the spring 30 is brought into a blind hole 32, defined in the flange 6a so as to extend axially inwardly from the arcuate end face of such flange 6a, thereby to restrain the nozzle assembly from tilting relative to the tubular handle 26.

This restraining mechanism shown in and described with reference to Fig. 10 is advantageous in that, since the tip of the engagement pin 31 slidingly rest on the arcuate end face of the flange 6a when the adjusting body 13 is moved to the maximum height position without the angular relationship between the nozzle assembly and the tubular handle 26 being fixed beforehand, no complicated alignment procedure is required.

During the adjustment of the adjusting body 13 to any one of the maximum, intermediate and minimum height positions, the detent piece 28 of the resilient tongue 27 is engaged in a corresponding one of the detent recesses 29a, 29b and 29c defined interiorly in the top housing component 2. However, it may happen that, when the adjusting body 13 is desired to be moved, for example, from the maximum height position towards the intermediate height position and, hence, the detent piece 28 which has been engaged in the rightmost detent recesses 29a as viewed in Fig. 4 is to be engaged in the intermediate detent recess 29b next to the rightmost detent recess 29a, the detent piece 28 skips over the intermediate detent recess 29b. This is particularly true when an excessive pushing or pulling force is applied to the manipulatable knob member 21.

The above discussed problem can, according to the present invention, be advantageously eliminated by the provision of a failsafe device. Referring now to Figs. 11 to 13, the failsafe device comprises a second resilient tongue 27a integrally formed with the bridge member of the adjusting body 13 so as to extend next to and parallel to the first resilient tongue 27, the free end of which tongue 27a is integrally formed with a detent piece 28a. The second resilient tongue 27a having the detent piece 28a may be of identical construction with the first resilient tongue 27 having the detent piece 28.

Cooperable with the second resilient tongue 27a and forming another part of the failsafe device is a cam piece 33 of generally triangular configuration. A base portion of said cam piece 33 which corresponds to the base of the shape of a triangle is formed integrally with, or otherwise secured rigidly to, the top housing component 2 in alignment with the path of movement of the detect piece 28a. The cam piece 33 has its apex portion recessed inwardly to define a detent recess 29d, said detent recess 29d being so positioned that simultaneous with the engagement of the detent piece 28 into the intermediate detent recess 29b, the detent piece 28a can be engaged in the detent recess 29d.

The failsafe device of the construction shown in and described with reference to Figs. 10 to 13 operates in the following manner. Assuming that the adjusting body 13 is moved from the maximum height position towards the intermediate height position, the detent piece 28a integral with the second resilient tongue 27a relatively slides over the cam piece 33 with the second tongue 27a consequently forced to bend downwards against the resiliency of such tongue 27. As the second tongue 27a is so deformed, the resilient tongue 27a accumulates energy necessary for it to restore to the original shape. Accordingly, by the action of the accumulated energy, the detent piece 28a can be instantly engaged into the detent recess 29d in the cam piece 33 with the second resilient tongue 27a restored to the original shape immediately upon the arrival of the adjusting body 13 to the intermediate height position as shown by the imaginary lines in Figs. 12 and 13.

It is to be noted that the foregoing description concerning the operation of the failsafe device equally applies even where the adjusting body 13 is moved from the minimum height position towards the intermediate height position.

In the modification shown in Fig. 14, the failsafe device comprises a generally arcuate leaf spring member 34 having one end secured to the bottom housing component 3. This leaf spring member 34 is so positioned and so shaped that, as the detent piece 28 is ready to be engaged into the intermediate detent recess 29b, the resilient tongue 27 then deformed downwardly can depress the leaf spring member 34 against the

resiliency of the leaf spring member 34 to permit the latter to accumulate energy necessary for it to restore to the original shape. Thus, by the action of the accumulated energies, the detent piece 28 ready to be engaged in the intermediate detent recess 29b can be instantaneously urged to fall into the intermediate detent recess 29b.

With the use of the failsafe device of the construction shown in any one of Figs. 10 to 13 and Fig. 14, the possibility of the detent piece 28 integral with the resilient tongue 27 skipping over the intermediate detent recess 29b can be advantageously avoided.

From the foregoing description, it has now become clear that the suction nozzle assembly embodying the present invention comprises a suction spout having a coupling stem for fluid-connection with a vacuum cleaner, a generally rectangular nozzle housing tiltably connected with the suction spout and having a sweeping surface defined at the bottom thereof, said sweeping surface being adapted to confront a surface to be cleaned, an elongated brush assembly carried by the nozzle housing for movement between projected and retracted positions in a direction perpendicular to the longitudinal sense of the housing through the sweeping surface, a brush height adjustment for adjustably moving the brush assembly to any one of the projected and retracted positions, and a restraining mechanism for restraining the housing from undergoing an arbitrary tilting motion relative to the suction spout. Accordingly, it is also clear that during the normal cleaning of the surface to be cleaned, the nozzle assembly can be kept generally parallel to the surface to be cleaned regardless of the position of the tubular handle connected to the suction spout, and regardless of the posture of the operator running the vacuum cleaner.

Where drag force is desired to be reduced by causing the brush assembly to protrude a maximum available distance outwards from the sweeping surface, or when relatively large dirt such as debris or like solids are desired to be sucked, the nozzle assembly can be restrained from undergoing any arbitrary tilting motion relative to the tubular handle and can therefore be stabilized.

Although the present invention has fully been described in connection with the preferred embodiments thereof with reference to the accompanying drawings, it is to be noted that various changes and modifications are apparent to those skilled in the art. Such changes and modifications are to be understood as included within the scope of the present invention as defined by the appended claims.

Claims

1. A suction nozzle assembly for a vacuum cleaner, which comprises a suction spout (5, 6) having a coupling stem (5) for fluid-connection with the vacuum cleaner, a generally rectangular nozzle housing (1) tiltably connected with the suction spout (5, 6) and having a sweeping surface defined at the bottom thereof, said sweeping surface being adapted to confront a surface to be cleaned, an elongated brush assembly (12) carried by the nozzle housing (1) for movement between projected and retracted positions in a direction perpendicular to the longitudinal sense of the housing (1) through the sweeping surface, a brush height adjustment for adjustably moving the brush assembly to either of the projected or retracted positions, characterized by restraining means for restraining the housing (1) from undergoing an arbitrary tilting motion relative to the suction spout (5, 6).

2. A suction nozzle assembly as claimed in claim 1, wherein the restraining means is operatively associated with the brush height adjustment.

3. An assembly as claimed in Claim 2, wherein said suction spout (5, 6) also has a generally cylindrical barrel (6) lying at right angles to the connecting stem (5), but in parallel to the longitudinal sense of the housing (1), and wherein said restraining means comprises an engagement piece (25) formed on the brush height adjustment, said engagement piece (25) being engageable into a recess (24) defined in one end of the cylindrical barrel (6) to refrain the housing (1) from undergoing the arbitrary tilting motion relative to the connecting spout (5, 6).

4. An assembly as claimed in Claim 3, wherein said recess (24) is of a generally V-shaped configuration.

5. An assembly as claimed in Claim 2, wherein said suction spout (5, 6) also has a generally cylindrical barrel (6) lying at right angles to the connecting stem (5), but in parallel to the longitudinal sense of the housing (1), and wherein said restraining means comprises a brake shoe (25a) provided on the brush height adjustment for sliding engagement with one end of the transverse barrel (6).

6. An assembly as claimed in Claim 2, wherein said suction spout (5, 6) also has a generally cylindrical barrel (6) lying at right angles to the connecting stem (5), but in parallel to the longitudinal sense of the housing (1), and wherein said restraining means comprises an engagement pin member (31) supported by the brush height adjustment and urged in one direction for engagement into a hole (32) defined in one end of the transverse barrel (6), said pin member (31) when engaged into said hole (32) restraining the housing (1) from undergoing the arbitrary tilting motion relative to the connecting spout (5, 6).

7. An assembly as claimed in Claim 1, wherein said brush assembly (12) is capable of being moved in a plurality of steps between the projected and retracted positions.

8. An assembly as claimed in Claim 7, wherein the brush height adjustment is movable in a direction parallel to the longitudinal sense of the housing (1) and has an elastic tongue (27) formed integrally therewith so as to extend lengthwise of

the housing (1), one end of said tongue (27) opposite to the adjustment being formed with a detent piece (28), and wherein a portion of the housing (1) confronting the path of movement of the detent piece (28) is formed with a plurality of detent recesses (29a, b, c) for selective engagement with the detent piece (28).

9. An assembly as claimed in Claim 8, further comprising a generally arcuate leaf spring (34) provided in a region corresponding to the positions of the detent recesses (29b) except for the detent recesses (29a, c) positioned on the opposite extremities of the path of movement of the brush height adjustment.

10. An assembly as claimed in Claim 7, wherein the brush height adjustment is movable in a direction parallel to the longitudinal sense of the housing (1) and has first and second elastic tongues (27, 27a) formed integrally therewith so as to extend lengthwise of the housing (1), each of said elastic tongues (27, 27a) having one end thereof opposite to the adjustment formed with a detent piece (28, 28a), and wherein a portion of the housing confronting the path of movement of the detent piece (28) of the first tongue (27) is formed with a plurality of first detent recesses (29a, b, c) for selective engagement with the detent piece (28) of the first tongue (27), and further comprising a cam member (33) provided interiorly in the housing (1) in alignment with the path of movement of the detent piece (28a) of the second tongue (27a), said cam member (33) having second detent recesses (29d) defined therein for selective engagement with the detent piece (28a) of the second tongue (27a), the number of said second recesses (29d) being smaller by two than that of the first detent recesses (29a, b, c) said second detent recesses (29d) being paired with the first detent recesses (29b) except for the two first detent recesses (29a, c) which are positioned on the opposite extremities of the path of movement of the brush height adjustment.

11. An assembly as claimed in Claim 7, wherein the brush height adjustment has formed therein stepped guide grooves (19) each having a plurality of steps at different elevation, and said brush assembly (12) has pins (20) equal in number to the number of the stepped guide grooves (19) and movably engaged in the respective stepped guide grooves (19).

12. A suction nozzle assembly as claimed in claim 1, wherein said nozzle has a suction channel defined at the bottom thereof, a lip member (11) made of flexible material and carried by the housing (1) on one side of, and generally in parallel to, the suction channel, a pair of brushes (12) carried by the housing (1) on one side of the lip member (11) opposite to the suction channel and on one side of the suction channel opposite to the lip member (11), respectively, for movement between projected and retracted positions through an intermediate position, and a brush height adjustment carried by the housing (1) for movement in a direction lengthwise of the housing (1) for movement between maximum and minimum height positions through an intermediate height position, said brushes (12) when said brush adjustment is moved to the minimum height position being held in the retracted position at which the height of the brushes (12) protruding outwards from the bottom (3) of the housing (1) is smaller than the height of the lip member (11), said brushes (12) when said brush height adjustment is moved to the intermediate height position being held in the intermediate position at which the height of the brushes (12) protuding outwards from the bottom (3) of the housing (1) is generally equal to the height of the lip member (11), and said brushes (12) when said brush height adjustment is moved to the maximum height position being held at the projected position at which the height of the brushes (12) protruding outwards from the bottom (3) of the housing (1) is higher than the height of the lip member (11).

Patentansprüche

1. Saugdüsenanordnung für einen Staubsauger;

mit einer Saugtülle (5, 6), die einen Anschlußstiel (5) zur Saugverbindung mit einem Staubsauger aufweist;

mit einem etwa rechteckförmigen Düsengehäuse (1), das schwenkbar mit der Saugtülle (5, 6) verbunden ist und an ihrem Boden eine auf die zu reinigende Fläche aufzusetzende Gleitfläche aufweist;

mit einer in dem Düsengehäuse (1) angeordneten, langgestreckten Bürstenanordnung (12), die zwischen einer vorstehenden und einer zurückgezogenen Position quer zur Längsrichtung des Gehäuses (1) gegenüber der Gleitfläche bewegbar ist;

mit einer Bürstenhöheneinstellvorrichtung zum Einstellen der Bürstenanordnung entweder in die vorstehende oder die zurückgezogene Position, gekennzeichnet durch eine Sperrvorrichtung, mit der eine freie Schwenkbewegung des Gehäuses (1) gegenüber der Saugtülle (5, 6) gesperrt wird.

2. Saugdüsenanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Sperrvorrichtung zusammen mit der Bürstenhöhenverstellung betätigbar ist.

3. Saugdüsenanordnung nach Anspruch 2, dadurch gekennzeichnet, daß die Saugtülle (5, 6) eine etwa zylindrische Trommel (6) aufweist, die sich rechtwinklig zum Anschlußstiel (5) erstreckt und parallel zur Längsrichtung des Gehäuses (1) verläuft; und daß die Sperrvorrichtung aus einem Ansatzstück (25) an der Bürstenhöhenverstellung besteht, das in eine Aussparung (24) an einem Ende der zylindrischen Trommel (6) eingreift, um eine freie Schwenkbewegung des Gehäuses (1) gegenüber der Saugtülle (5, 6) zu verhindern.

4. Saugdüsenanordnung nach Anspruch 3, dadurch gekennzeichnet, daß die Aussparung (24) etwa V-förmig ausgebildet ist.

5. Saugdüsenanordnung nach Anspruch 2,

dadurch gekennzeichnet, daß die Saugtülle (5, 6) eine etwa zylindrische Trommel (6) aufweist, die sich rechtwinklig zum Anschlußstiel (5) erstreckt und parallel zur Längsrichtung des Gehäuses (1) verläuft; und daß die Sperrvorrichtung einen Bremsschuh (25a) aufweist, der an der Bürstenhöhenverstellung zum Reibungsangriff an einem Ende der quer verlaufenden Trommel (6) angeordnet ist.

6. Saugdüsenanordnung nach Anspruch 2, dadurch gekennzeichnet, daß die Saugtülle (5, 6) eine etwa zylindrische Trommel (6) aufweist, die sich rechtwinklig zum Anschlußstiel (5) erstreckt und parallel zur Längsrichtung des Gehäuses (1) verläuft; und daß die Sperrvorrichtung einen Abtaststift (31) aufweist, der an der Bürstenhöhenverstellung angeordnet ist und in Richtung auf eine Öffnung (32) vorgespannt ist, die in einem Ende der quer verlaufenden Trommel vorgesehen ist, und

daß der Abtaststift beim Eingriff in die Öffnung (32) das Gehäuse (1) daran hindert, eine freie Schwenkbewegung gegenüber der Saugtülle (5, 6) auszuführen.

7. Saugdüsenanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Bürstenanordnung (12) in eine Mehrzahl von Stellungen zwischen der vorstehenden und der zurückgezogenen Position einstellbar ist.

8. Saugdüsenanordnung nach Anspruch 7, dadurch gekennzeichnet, daß die Bürstenhöhenverstellung in einer Richtung parallel zur Längsrichtung des Gehäuses (1) bewegbar ist und mit einer integral angeformten elastischen Zunge (27) versehen ist, die sich in Längsrichtung des Gehäuses (1) erstreckt, daß ein Ende dieser Zunge (27) gegenüber der Verstellung mit einem Rastvorsprung (28) versehen ist, und daß ein Teil des Gehäuses (1), der dem Bewegungspfad des Rastvorsprunges (28) gegenüberliegt, mit einer Mehrzahl von Rastausschnitten (29a, b, c) zum wahlweisen Eingriff des Rastvorsprunges (28) versehen ist.

9. Saugdüsenanordnung nach Anspruch 8, gekennzeichnet durch eine etwa bogenförmige Blattfeder (34), die in dem Bereich der Position des mittleren Rastausschnittes (29b), jedoch nicht der Rastausschnitte (29a, c), an den entgegengesetzten, äußeren Enden des Bewegungspfades der Bürstenhöhenverstellung angeordnet ist.

10. Saugdüsenanordnung nach Anspruch 7, dadurch gekennzeichnet, daß die Bürstenhöhenverstellung in einer Richtung parallel zur Längsrichtung des Gehäuses (1) bewegbar ist und mit einer ersten und einer zweiten integral angeformten, elastischen Zunge (27, 27a) versehen ist, die sich in Längsrichtung des Gehäuses (1) erstrecken,

daß jeweils ein Ende dieser elastischen Zungen (27, 27a) mit je einem Rastvorsprung (28, 28a) versehen ist, daß ein Teil des Gehäuses, der dem Bewegungspfad des Rastvorsprunges (28) der ersten Zunge (27) gegenüberliegt, mit einer Mehrzahl von ersten Rastausschnitten (29a, b, c) zum wahlweisen Eingriff des Rastvorsprunges (28) der ersten Zunge versehen ist,

daß ein Nockenglied (33) innerhalb des Gehäuses (1) vorgesehen ist, das gegenüber dem Bewegungspfad des Rastvorsprunges (28a) der zweiten Zunge (27a) ausgerichtet ist und zweite Rastausschnitte (29d) zum wahlweisen Eingriff des Rastvorsprunges (28) der zweiten Zunge (27a) aufweist,

daß die Anzahl von zweiten Ausschnitten (29d) um zwei kleiner als die Anzahl der ersten Rastausschnitte (29a, b, c) ist,

daß die zweiten Rastausschnitte (29d) mit den ersten Ausschnitten (29b) gepaart sind, mit Ausnahme der beiden ersten Rastausschnitte (29a, c), die an den entgegengesetzten äußeren Enden des Bewegungspfades der Bürstenhöhenverstellung liegen.

11. Saugdüsenanordnung nach Anspruch 7, dadurch gekennzeichnet, daß die Bürstenhöhenverstellung mit gestuften Führungsnuten (19) versehen ist, von denen jede eine Mehrzahl von Stufen auf verschiedenen Höhen aufweist,

daß die Bürstenanordnung (12) Stifte (20) gleicher Anzahl wie die Anzahl der gestuften Führungsnuten (19) aufweist, und

daß diese Stifte in den entsprechenden Führungsnuten (19) bewegbar geführt sind.

12. Saugdüsenanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Düse an ihrem Boden einen Saugkanal sowie ein Lippenteil (11) aus flexiblem Material aufweist, das an dem Gehäuse an einer Seite des Saugkanals und parallel zu diesem angeordnet ist, daß an dem Gehäuse zwei Bürsten (12) auf einer Seite des Lippenteils (11) gegenüber dem Saugkanal bzw. auf einer Seite des Saugkanals gegenüber dem Lippenteil (11) zur Bewegung zwischen vorgeschobenen über mittleren zu zurückgezogenen Stellungen angeordnet sind,

daß das Gehäuse (1) eine Bürstenhöhenverstellung zur Bewegung in Längsrichtung des Gehäuses (1) zwischen einer maximalen Höhenposition über eine mittlere Position zu einer minimalen Höhenposition trägt, daß die Bürsten (12) in der minimalen Höhenposition in der zurückgezogenen Stellung gehalten werden, in der die Höhe der aus dem Boden (3) des Gehäuses (1) herausstehenden Bürsten (12) kleiner als die Höhe des Lippenteils (11) ist,

daß die Bürsten (12) in der mittleren Höhenposition in einer mittleren Position gehalten werden, in der die Höhe der aus dem Boden (3) des Gehäuses (1) herausstehenden Bürsten (12) etwa gleich der Höhe des Lippenteils (11) ist, und

daß die Bürsten (12) in der maximalen Höhenposition in der vorgeschobenen Stellung gehalten werden, in der die Höhe der aus dem Boden (3) des Gehäuses (1) herausstehenden Bürsten (12) größer als die Höhe des Lippenteils (11) ist.

Revendications

1. Patin aspirant pour aspirateur, qui comporte une goulotte d'aspiration (5, 6) ayant une tige de raccordement (5) destinée à assurer le raccordement à l'aspirateur pour la circulation d'un fluide, un boîtier (1) de patin de forme générale rectangu-

laire raccordé à la goulotte d'aspiration (5, 6) de manière qu'il puisse pivoter et ayant une surface d'essuyage délimitée à sa partie inférieure, la surface d'essuyage étant destinée à être placée en face d'une surface à nettoyer, un ensemble allongé à balais (12) porté par le boîtier (1) du patin et destiné à se déplacer entre les positions avancée et reculée en direction perpendiculaire à la longueur du boîtier (1) et transversale à la surface d'essuyage, et un dispositif de réglage en hauteur de balais destiné à déplacer de manière réglable l'ensemble à balais vers la position avancée ou reculée, caractérisé par un dispositif de retenue du boîtier (1) afin que celui-ci ne puisse pas présenter un mouvement arbitraire de basculement par rapport à la goulotte (5, 6) d'aspiration.

2. Patin d'aspiration selon la revendication 1, dans lequel le dispositif de retenue est associé au dispositif de réglage en hauteur de balais.

3. Patin selon la revendication 2, dans lequel la goulotte d'aspiration (5, 6) a aussi un corps de forme générale cylindrique (6) placé perpendiculairement à la tige de raccordement (5), mais parallèle à la longueur du boîtier (1), et dans lequel le dispositif de retenue comporte un organe de contact (25) formé sur l'organe de réglage en hauteur de balais, l'organe de contact (25) étant destiné à pénétrer dans une cavité (24) délimitée à une première extrémité du corps cylindrique (6) afin que le boîtier (1) ne puisse pas présenter le mouvement arbitraire de basculement par rapport à la goulotte de raccordement (5, 6).

4. Patin selon la revendication 3, dans lequel la cavité (24) a une forme générale en V.

5. Patin selon la revendication 2, dans lequel la goulotte d'aspiration (5, 6) a aussi un corps de forme générale cylindrique (6) qui est perpendiculaire à la tige de raccordement (5), mais parallèle à la longueur du boîtier (1), et dans lequel le dispositif de retenue comporte un patin de freinage (25a) placé sur le dispositif de réglage en hauteur de balais et destiné à coopérer par coulissement avec une extrémité du corps transversal (6).

6. Patin selon la revendication 2, dans lequel la goulotte d'aspiration (5, 6) a aussi un corps de forme générale cylindrique (6) qui est perpendiculaire à la tige de raccordement (5), mais parallèle à la longueur du boîtier (1), et dans lequel le dispositif de retenue comporte une tige de contact (31) supportée par le dispositif de réglage en hauteur de balais et repoussée dans un sens tel qu'elle pénètre dans un trou (32) délimité à une première extrémité du corps transversal (6), la tige (31), lorsqu'elle a pénétré dans le trou (32), empêchant le pivotement arbitraire du boîtier (1) par rapport à la goulotte de raccordement (5, 6).

7. Patin selon la revendication 1, dans lequel l'ensemble à balais (12) peut être déplacé en plusieurs étapes entre les positions avancée et reculée.

8. Patin selon la revendication 7, dans lequel le dispositif de réglage en hauteur de balais est mobile en direction parallèle à la longueur du boîtier (1) et a une languette élastique (27) formée en une seule pièce avec lui afin qu'elle soit disposée suivant la longueur du boîtier (1), une première extrémité de la languette (27) opposée au dispositif de réglage étant munie d'un organe d'encliquetage (28), et dans lequel une partie du boîtier (1) placée en face du trajet de déplacement de l'organe d'encliquetage (28) a plusieurs cavités (29a, 29b, 29c) d'encliquetage destinées à coopérer sélectivement avec l'organe d'encliquetage (28).

9. Patin selon la revendiation 8, comprenant en outre un ressort à lame de forme générale courbe (34) placé dans une région correspondant aux positions des cavités (29b) d'encliquetage, sauf des cavités (29a, 29c) qui se trouvent aux extrémités opposées du trajet de déplacement du dispositif de réglage en hauteur de balais.

10. Patin selon la revendication 7, dans lequel le dispositif de réglage en hauteur de balais est mobile en direction parallèle à la longueur du boîtier (1) et a une première et une seconde languette élastique (27, 27a) formées en une seule pièce avec lui afin qu'elles soient placées suivant la longueur du boîtier (1), chacune des languettes élastiques (27, 27a) ayant une première extrémité opposée au dispositif de réglage qui a un organe d'encliquetage (28, 28a), et dans lequel une partie du boîtier placée en face du trajet de déplacement de l'organe d'encliquetage (28) de la première languette (27) a plusieurs cavités (29a, 29b, 29c) d'encliquetage destinées à coopérer sélectivement avec l'organe d'encliquetage (28) de la première languette (27), et comprenant en outre un organe de came (33) placé à l'intérieur de boîtier (1) dans l'alignement du trajet de déplacement de l'organe d'encliquetage (28a) de la seconde languette (27a), l'organe de came (33) ayant des secondes cavités (29d) d'encliquetage délimitées afin qu'elles coopèrent sélectivement avec l'organe d'encliquetage (28a) de la seconde languette (27a), le nombre de secondes cavités (29d) étant inférieur de deux unités à celui des premières cavités d'encliquetage (29a, 29b, 29c), les secondes cavités d'encliquetage (29d) étant appariées aux premières cavités d'encliquetage (29b), à l'exception des deux cavités d'encliquetage (29a, 29c) qui se trouvent aux extrémités opposées du trajet de déplacement du dispositif de réglage en hauteur de balais.

11. Patin selon la revendication 7, dans lequel le dispositif de réglage en hauteur de balais a des gorges (19) à gradins de guidage ayant chacune plusieurs gradins à des hauteurs différentes, et l'ensemble à balais (12) a des ergots (20) en nombre égal au nombre des gorges de guidage. (19) et coopérant avec ces gorges respectives (19) dans lesquelles ils peuvent se déplacer.

12. Patin selon la revendication 1, dans lequel le patin a un canal d'aspiration délimité à sa partie inférieure, une lèvre (11) formée d'un matériau flexible et portée par le boîtier (1) d'un côté du canal d'aspiration et parallèlement de façon générale à celui-ci, deux balais (12) portés par le boîtier

(1) d'un côté de la lèvre (11) qui est opposé à celui du canal d'aspiration et d'un côté du canal d'aspiration qui est opposé à celui de la lèvre (11) respectivement, afin qu'ils se déplacent entre des positions avancée et reculée par l'intermédiaire d'une position intermédiaire, et un dispositif de réglage de hauteur de balais porté par le boîtier (1) et destiné à se déplacer suivant la longueur du boîtier (1) entre des positions de hauteurs maximale et minimale par l'intermédiaire d'une position de hauteur intermédiaire, les balais (12), lorsque le dispositif de réglage en hauteur de balais est déplacé vers la position de hauteur minimale, étant maintenus en position reculée dans laquelle la hauteur de balais (12) dépassant à l'extérieur du fond (3) du boîtier (1) est inférieure à la hauteur de la lèvre (11), les balais (12), lorsque le dispositif de réglage de hauteur de balais est déplacé dans la position de hauteur intermédiaire, étant maintenus dans la position intermédiaire dans laquelle la hauteur de balais (12) dépassant à l'extérieur du fond (3) du boîtier (1) est égale de façon générale à la hauteur de la lèvre (11), et les balais (12), lorsque le dispositif de réglage en hauteur de balais est déplacé vers la position de hauteur maximale, étant maintenus dans la position avancée dans laquelle la hauteur de balais (12) dépassant à l'extérieur du fond (3) du boîtier (1) est supérieure à la hauteur de la lèvre (11).

Fig.1

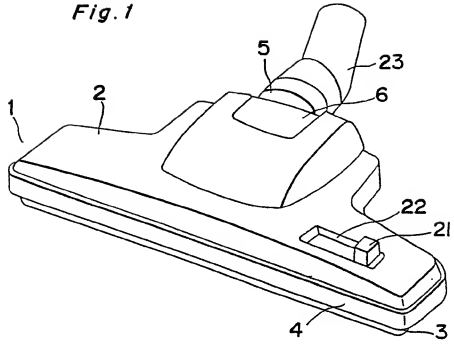
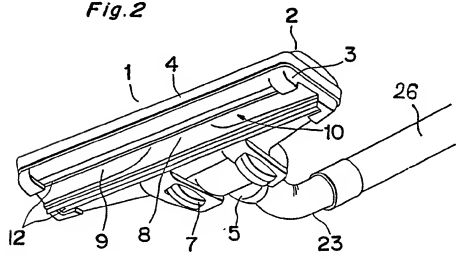


Fig.2



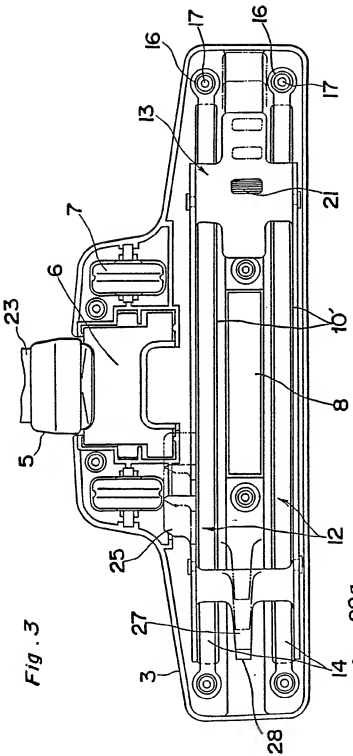

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Fig. 3

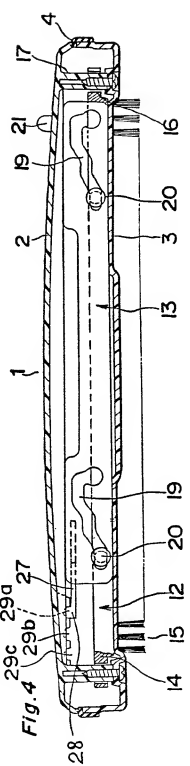
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Fig. 4

Fig. 5

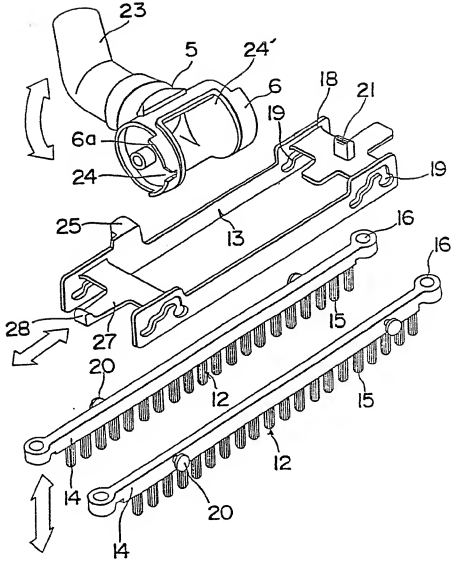

Fig.6

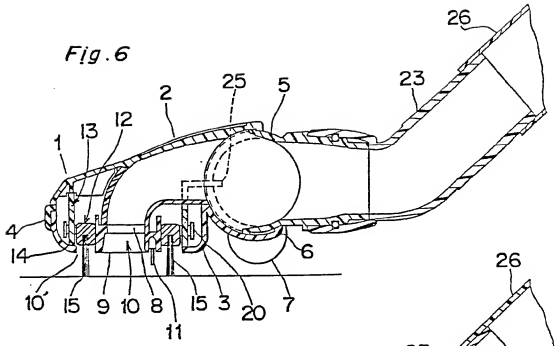

Fig.7

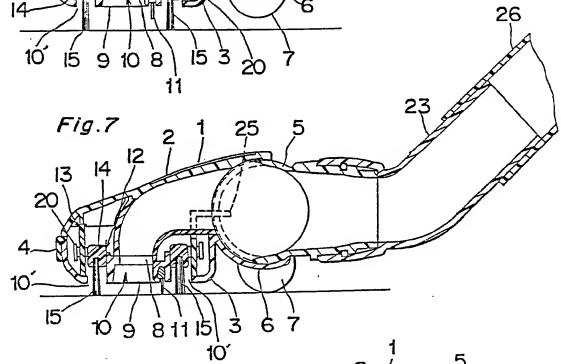

Fig.8

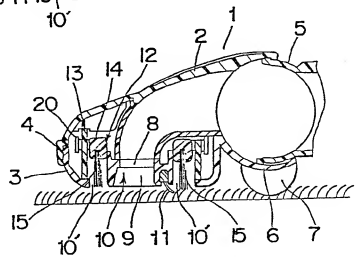

Fig. 9

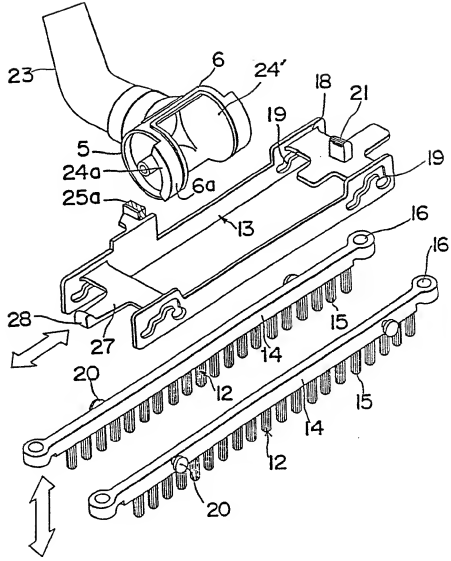

Fig. 10

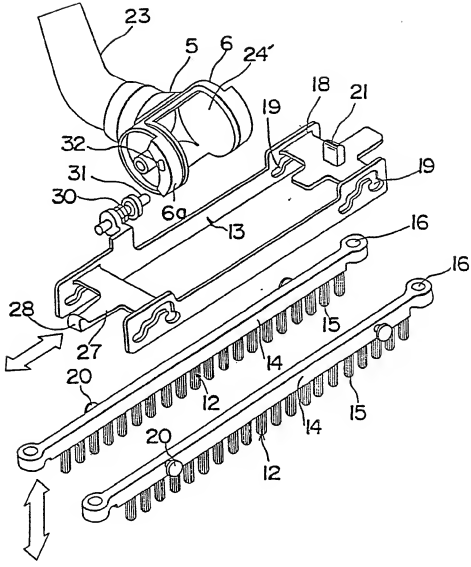

Fig. 11

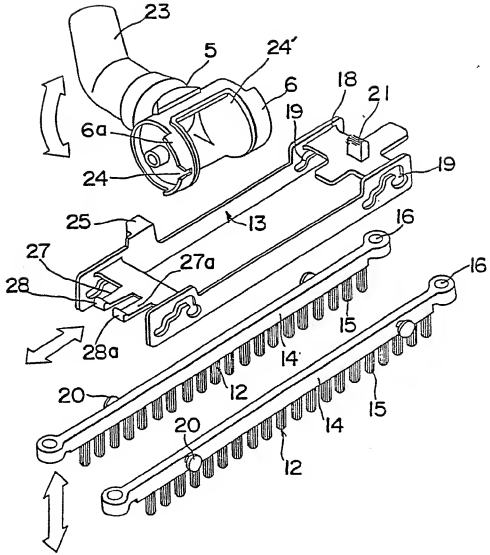
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Fig. 12

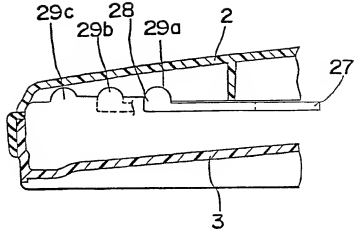

Fig .13

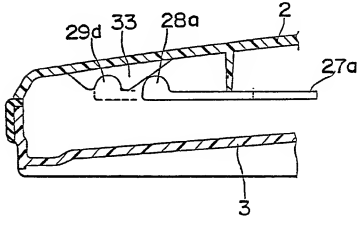

Fig. 14